

BRIEFER ARTICLES.

THE SOUTHERN MAIDENHAIR FERN IN THE BLACK HILLS OF SOUTH DAKOTA.

SPECIMENS of *Adiantum capillus-veneris* L., said to have grown wild at Cascade, in the Black Hills of South Dakota, were sent to me by Mrs. Alice M. Crary a couple of months ago. Yesterday, in company with Dr. Frederic E. Clements, I visited the locality and found the ferns growing in great abundance along the banks of a stream of warm water which issues from several very large springs. The banks of this stream, for nearly a mile, are lined with the ferns of all sizes and ages, from those just issuing from the gametophytes (which were abundant) to fruiting specimens 40 to 50^{mm} high. A thorough examination convinced us that it is indigenous along this warm stream, and that it has not been introduced by human agency.—CHARLES E. BESSEY, *The University of Nebraska, August 25, 1898.*

BACTERIAL CONTENT OF HAILSTONES.

BUJWID¹ seems to have been the first investigator to make a bacteriological examination of hailstones. The stones examined by him fell during a storm at Warschau, on May 4, 1888. He washed them carefully in sterilized water, then broke them into small pieces, put them into a sterilized test tube, and made plates from the water obtained from melting. In 1^{cc} of this water he found 21,000 bacteria, and from these he isolated the following species: *B. fluorescens liquefaciens*, *B. fluorescens putridus*, and *B. janthinus* (Zopf). He was of the opinion that surface water had been carried into the air by the storm and frozen, and that this fact accounted for the large number of germs found in the hail.

Foutin² also examined hail by bacteriological methods in 1888. The storm occurred at St. Petersburg, and the stones were about the

¹ BUJWID, O.: Die Bakterien in Hagelkörner. Centralbl. für Bakt. 3:1. 1888.

² FOUTIN, W. M.: Die Bakteriologische Untersuchungen von Hagel. Wratsch. 1889, nos. 49, 50. Quoted from an abstract in the Centralbl. für Bakt. 7:372. 1890. 1898]

size of a walnut, and fell with sufficient force to break windows. The stones were carefully washed, melted, and plates made from the water. The number found was 628 to 729 bacteria per 1^{cc}. Only bacteria were discovered, and neither fungi nor yeasts were noticed. He described the morphology and cultural characteristics of two cocci, and two bacilli; of these one coccus was pathogenic in large doses to rats.

On July 15, 1897, a violent hailstorm swept over Guelph, and hail fell heavily for about fifteen minutes, with such force as to break many panes of glass in the greenhouses. The stones averaged 20^{mm} in diameter, and looked like round bullets made in a badly fitting mould, with a projecting rim around the center. A number of these were taken to the laboratory, washed in mercuric chloride (1 to 500), rinsed several times in sterilized cold water, and each stone thus treated was dropped into a tube of melted nutrient gelatine, thoroughly shaken, and plates then poured in the usual manner. Four days after the plates were counted by the aid of Pakes' apparatus; the quantitative results were as follows:

12	per hailstone,	all bacteria.
35	"	" " "
52	"	a few molds present.
53	"	" " "
352	"	nearly all molds.
368	"	a few molds.
608	"	mostly molds.
704	"	a few molds.
1280	"	" "
1440	"	" "
2880	"	" "
3680	"	" "

11464: an average of 955 per hailstone.

These numbers err on the small side, as a portion of the hailstone was lost in the cleansing process. All the bacteria and a number of the moulds were isolated, and their cultural characteristics noted. Among those present were *Penicillium glaucum*, *Mucor* sp., *Aspergillus* sp., *B. fluorescens liquefaciens*, *B. fluorescens non-liquefaciens*, a protean form similar to *Proteus vulgaris* (Hauser), and one other germ subsequently described. No micrococci were found.

On July 30 another hailstorm occurred more violent than the

former, but of shorter duration. Twenty hailstones were accurately measured, the largest being 25^{mm} in diameter and 18^{mm} thick, the smallest 15^{mm} by 7^{mm}. The average of the twenty was 19^{mm} by 15^{mm}. They were more spherical than those examined on the previous occasion. They were treated as previously outlined, but all were placed in a sterilized test tube, and slowly melted. Fifteen plates were made from gelatine, containing varying amounts of the hailstone water. The average number of bacteria and spores of moulds counted was 1125 per c.c. The number of moulds present was far smaller than before. Three bacilli and two cocci were isolated. *B. fluorescens liquefaciens*, and *B. fluorescens non-liquefaciens* were again present.

It is worthy of note that these fluorescing germs were present on both occasions, and, further, Bujwid also found two of this class present. The repeated presence of these micro-organisms lends additional support to Bujwid's surmise that surface water is carried up by the storm and congealed. The presence of so many moulds in the hail was probably due to contamination from the air, which at that time (July) contained numerous species.

Of the remaining germs found, one closely resembles *Sarcina alba* Zimmermann, but does not liquefy gelatine even after two weeks growth. Another appears to be closely allied to *Bacillus candicans* Frankland, but differs in its growth on potato and in milk. Two micro-organisms found do not conform to any published description in the literature at my disposal, and unless any other worker recognizes them as already described species, I would suggest that the bacillus be called *B. flavus grandinis*, and the coccus *M. melleus grandinis*.

BACILLUS FLAVUS grandinis.—Found in hailstones : a large bacillus, with rounded ends, occurring singly and in pairs; $1 \times 3\mu$, varying according to the media, longer when growing in bouillon ; non-motile : no spore formation observed : grows readily at 20°C., sparingly at 37°C. : aerobic, will not grow in hydrogen (Novy's method) : does not liquefy gelatine : yellow (flavus)³ : stains readily with all the anilines : in gelatine plate culture the surface colony is about 3^{mm} in diameter, waxy, bright yellow, and appears coarsely granular with a low power ; the submerged colony is perfectly round with sharp edges, and very coarsely granular : in gelatine stick culture, after four days' growth, the line of puncture appears cloudy, and a pale lemon growth spreads

³SACCARDO, P. A. : Chromotaxia seu nomenclator colorum. 1894.

over the entire surface: in agar streak culture there is abundant massive growth, glistening and faintly tinged with yellow: milk is coagulated on the fifth day, the curd solid with a yellowish cast, and per cent. of acidity 0.8: on potato a dry, beady, raised and dirty yellow growth: in fermentation tube no gas is produced in glucose bouillon, growth only in the open arm of the tube: grows well in Uschinsky's media, a ring of yellow color being deposited around the upper part of the tube: bouillon becomes slightly turbid, with thick zooglœa.

MICROCOCCUS MELLEUS grandinis.—Found in hailstones: a coccus, occurring singly, about 1μ in diameter: non-motile: no spore formation observed: grows well at 20°C ., feebly at 37°C .: aerobic: will not grow in hydrogen (Novy's method): does not liquefy gelatine: yellow (melleus)³: stains readily with all the anilines: in gelatine plate cultures the surface colony small, about 1^{mm} in diameter, with an irregular margin, the outer portion a darker yellow than the center, granular; the submerged colony round, edges irregularly indented, contents granular: in gelatine stick culture a thin feather-like growth along the line of puncture, growth spreading irregularly on the surface, amber colored: in agar streak culture grows abundantly as a raised, glistening, and amber yellow-colored growth: when touched with a needle the growth adheres and can be drawn out in a long string: milk is not coagulated, and there is no acidity: on potato a dry raised growth, bright amber color, growth slow: in fermentation tube no gas is produced, and growth is only in the open arm of the tube: grows slowly in Uschinsky's media, a zooglœa of a pale yellow color being formed: in bouillon a slimy mass is formed that settles to the bottom of the tube.—F. C. HARRISON, *Guelph, Ontario*.